

II. Remarks

Reconsideration and allowance of the subject application are respectfully requested.

Claims 176-184 are pending in the application.

Claim 176 is independent.

Applicants have added new Claims 176-184 to afford themselves a scope of protection commensurate with the disclosure. The new claims are fully supported in the specification and Drawings, and are believed to be allowable for the reasons to be developed below. Note that these claims have been added for clarity with respect to the specification and Drawings, and not in response to any statutory requirement. Please also note that the newly-added claims correspond closely to the allowed apparatus claims of the corresponding EPO patent EP 0947 304 B1 (copy enclosed). Please note further that corresponding method claims have already been allowed in U.S. Patent No. 6,558,598.

Claims 99-175 were rejected as being unpatentable over JP 08-103948 and Bellehache, for the reasons discussed on pages 2 - 6 of the Office Action. Applicants respectfully traverse all art rejections.

In order to understand the advance made in the technology by the present invention, it is a fundamental requirement not only to understand the underlying technical problem addressed by the application, but also the objective

differences in the teachings in the cited art. Failure to adopt this approach leads to a flawed assessment of what is known in the art and how the teachings of multiple prior art documents should be applied to avoid constructing arguments with hindsight using *ex-post facto* analysis. In assessing inventive step (or obviousness) and the capabilities of the nominal person of ordinary skill in the art, one must always be conscious that it is a question of what the skilled person *would do*, and not what the skilled person *could do* (which would otherwise lead, through hindsight, to the exercise of inventive faculty). As such, the cherry-picking of prior art features from a multiplicity of documents does not and cannot ever constitute a sustainable nor valid approach for assessing inventive step and non-obviousness.

With respect to prior art JP 08-103948 to Frontier, this document is extremely limited in its teaching and does not in any way anticipate the claims under 35 U.S.C. §102. To assist the Examiner in attaining a complete understanding, an English language translation of the Japanese application is provided herewith.

JP 08-103948 is alleged to be the closest prior art, but its functional and structural configuration suggests otherwise. Frontier always operates to place a molded preform in a dedicated *cooling chamber* 30, rather than to cool the preform whilst it is retained in an *extraction device* 51 that,

in contrast, operates merely to remove preforms from a mold 2 without applying any forced cooling regime. Referring to FIGs. 4 and 8, it can be appreciated that a take-off robot releases the preform onto an upstanding "cylindrical protrusion 146" (or cooling pin) such that the cooling pin bottoms out on the preform. As such, the pins are fixed within a conveyor system ("preform transfer route 13") of the cooling chamber 10, 30. Consequently, the speed at which specific preform cooling can be undertaken in Frontier is inhibited by its adopted configuration and, in fact, the cooling capacity and overall operation capacity of Frontier is significantly slower than the application, as will become apparent. In reality, by the time that the preform is delivered onto the pin in the cooling chamber 10, 30 of the Frontier system, crystallization will already have started to occur in the preform.

In Frontier, with regard to the pin configuration itself, the pin (as can be clearly seen in FIG. 3b) includes a plurality of air diffusing holes 147, 148 along its entire length. Each pin is therefore designed to produce an overall (homogenous) cooling effect along the entire internal preform surface, which internal cooling is only complementary to the external surface cooling achieved by placing the preform in a dedicated cooling chamber. The pin in Frontier has no ability whatsoever to focus cooling by causing "expulsion of the gaseous cooling fluid from the tip mostly in a direction of the

[relatively hot] first region to accentuate cooling within at least the first region", as is required by the (granted EP) claim.

Since the cooling chamber 30 of Frontier has a hood, the take-out robot must physically release the preform and thus expose the exterior of the preform, otherwise the system could not operate; this is illustrated in FIGs. 2, 3(a) and 8. Consequently, in contrast with the present invention, aggressive and focused cooling of the preform does not and cannot simultaneously occur with the holding and cooling of the preform by the holder of the extraction device (or end-of-arm tool) of Frontier.

Moreover, Frontier fails to describe or suggest the problem of crystallization in the (hot) sprue gate region, especially since no doubt can be expressed that *the upstanding cylindrical protrusion 146 of Frontier can only be arranged to support the preform at a time when the internal surface of the preform is relatively cold and mechanically stable*; this will become apparent from the analysis below.

It is also abundantly clear that the present invention calls for the cooling pin to be (physically) spaced away from the inside wall of the molded article (e.g. preform), whereas the cooling pin of Frontier must at least be in some continuous touching engagement with the bottom of the preform. In this regard, in the context of Frontier, the Examiner

appears to suggest that, if cooling fluid is distributed into the interior of the preform, a space between the cooling pin and the molded article must exist. With respect, the Examiner has not, however, considered this point thoroughly because there are two alternative scenarios offered by the system of Frontier, with Frontier being entirely unclear and therefore deficient in its teachings. Clearly, however, in order that air can circulate in the interior of the parison (when located on the cooling pin of Frontier) a limited venting space must be present.

The space between the tip of the cooling pin of Frontier can be small (if not microscopic) in instances where the pressure of cooling fluid is low and insufficient to lift the formed parison clear of the end of the tube. In such a case, the tip of the cooling pin is not spaced away from the dome region, as called for by the claim, but must instead be in some continuous touching engagement with the internal surface of the dome; this is a natural consequence of gravity and Newton's First and Second Laws of Motion. The independent claim is therefore already further distinguished and novel over Frontier. Furthermore, should the system of Frontier operate in this low pressure way, in instances where the preform is sufficiently hot, then deformation of the preform will occur in the region of the sprue gate at the point of contact. With surface contact between the pin and interior of the preform,

deformation could take the form of scratching or, most likely, physical distortion. Frontier's cooling chamber 30 is therefore operational only after the glass transition temperature and steady state of the preform has been attained, i.e. preform transfer in Frontier happens at a time when crystallization has already occurred in the preform or when extended in-mold cooling has ensured preform stability.

In contrast, the present invention describes a system that inherently operates when the preform is hot and subsequently subject to deformation, because the present invention looks to decrease cycle time by releasing the preform from the mold as early as possible. The technical problems associated with very early molded article release represented, prior to the present invention, unanswerable questions and a long-felt want within the injection molding industry.

Also, at low pressures, the cooling of Frontier is also arguable ineffective in relation to the relatively thick dome portion of a preform and hence insufficient to prevent crystallization. Frontier has no aggressive and concentrated (area specific) cooling strategy, as advocated by the present invention, nor does Frontier describe, suggest or imply that concentrated cooling is important or even desirable. Frontier only has limited efficiency, homogeneous and gentle interior cooling provided by the array of air diffusion holes 147, 148 distributed along the length of the cooling pin. In fact, the

existence of a multiplicity of air diffusing holes along the length of the Frontier pin ("cylindrical protrusion 146") would result in little more than a tranquil, benign and gentle expression of air from the actual tip of the Frontier pin. For a low pressure system perspective, Frontier can only cause the cooling pin to support the preform after the preform has cooled, otherwise the preform is deformed and rendered useless. Anyway, irrespective of whether the preform is treated in a hot or a relatively cold state, the preform would be subject to undesirable crystallization arising from the delay in applying any form of effective, aggressive or concentrated cooling and the inefficient and time wasteful mechanism by which interior cooling is initiated and/or accomplished.

Alternatively, should the Frontier pins express pressurized air at high pressures, it is postulated that a spaced apart relationship could exist for some period of time, but this is neither disclosed nor suggested in Frontier. Assuming, for a moment, that a jet of pressurized air could be expressed through the holey Frontier pin and such a jet of pressurized air is applied only after contact (which apparently nevertheless contradicts with FIGs. 4 and 7), then deformation would occur if the preform was hot (as indicated *supra*) because of the initially touching engagement of the pin and the domed interior of the preform. If the preform is at any time solely air-supported by an accurately balanced pressurized flow, which

would indeed require very high pressure and considerable control, then there would also be considerable instability in the levitation of the preform on the cooling pin, which instability would result in the preform wobbling and, consequently, being damaged/mark at points of contact between the interior surface of the preform and the upstanding cylindrical protrusion 146. Moreover, instability in the position of the preform would result in coolant being directed to areas other than principally the gate portion. In summary, even if the preform is cooled and applied to a high pressure system, scratching of the interior wall of the preform would still result from the mechanisms described above and the preform would therefore be unusable and rejected by a customer for insufficient part quality.

Furthermore, Frontier clearly shows that a plenum exists under an array of cooling pins, with the plenum receiving a non-concentrated flow of air 161, 361 from blowers 16 and 36. If one nevertheless progresses the argument that the plenum-blower combination ensures that the preforms are lifted from each pin by air pressure, and multiple preforms are simultaneously delivered as an array from the extraction device 51 (as shown in FIG. 2), the pressure within the plenum would be immense. Assuming a nominal weight of 28 grams for each preform (required for a typical 500 ml carbonated drinks bottle) and an internal surface area (in the dome) of about 2

cm², the pressure required at the tip to counteract gravity and the weight of each preform would be ((mass times acceleration due to gravity) divided by unit area) approximately 147 kPa (or ~1.5 bar) per pin. However, the pin contains multiple holes along their entire length so there is no single focused lift point, and there are multiple pins distributed across multiple arrays of pins. The air blower would therefore need to deliver and circulate air at, potentially, many hundreds (if not thousands) of bars of pressure! Also, irrespective of whether a pressurized jet of air is either provided as a constant stream or applied after location of the preform onto the pin, deformation will occur when the jet of air lifts the preform onto an air-cushion because (if the dome portion of the preform is in a hot state, as suggested by the Examiner) the very high pressure jet of air is incident on a malleable (i.e. fluid) interior wall of the preform that will deform. Additionally, upon cutting the air-flow (as will obviously occur at the off-loading OUT point of FIGs. 4 and 7), further deformation (typically manifested in the form of scratching or chipping) of the interior of the preform would result from the abrupt drop of the still relatively hot plastic preform onto the mechanically stable, hard and upstanding cylindrical protrusion 146. In summary, there is absolutely no indication that Frontier operates in a high pressure environment. Indeed, it is submitted that the architecture disclosed in Frontier is

incompatible with a high pressure environment, especially since it is clear that air introduced into the plenum in a direction tangential to the upstanding pins and their internal channels, e.g. as seen in FIG. 3(a). Consequently, in contrast with the claimed invention, the preforms must be in touching contact with the tips of the pins at all times and, in contrast with the present invention, no separation ever exists between the tips of the pins and the preforms when the end-of-arm tool is in its second position. The claimed invention is therefore further differentiated over Frontier and cannot be anticipated by Frontier.

Turning again to the indisputable fact that each pin in Frontier includes a plurality of air diffusing holes 147, 148 along its length, these diffusing holes cooperate to ensure that there is not and cannot be any focus or even expulsion of gaseous cooling fluid mostly in a direction of the first region (e.g. the dome region) of relatively high heat. The claimed invention is therefore further differentiated over Frontier and cannot be anticipated by Frontier.

As to the point of release of the preform from the extraction device 51 onto the pin, this question is left entirely unaddressed in Frontier. There are, however, three apparent alternatives that can be considered, although there is no indication whatsoever in Frontier as to which is preferred or which is effective:

i) The first release point is where the mouth of the preform is spaced above the uppermost tip of the pin and the preform is dropped onto the pin or air stream. In this case, the "second position" of the extraction device [end-of-arm tool] is such that the tip of the cooling pin is never within the preform whilst the preform is within its respective holder, the "second position" being defined in the claim and the specification (of the instant application) as an end point of travel of an out of mold location. In contrast, the main claim recites the requirement that the tip of the pin and the frame, in use, "move relative to the end-of-arm-tool to cause insertion of the tip of the cooling pin into the molded article after the end-of-arm-tool reaches the second position...and... the passageway of the open system is produced by the formation of a space between a region of an external surface of the cooling pin and an open end of the molded article both located, in use, within the respective holder...". Purely based on conjecture, it is probably not credible to suggest that Frontier teaches the release of the preform above the upstanding cooling pin since, upon being dropped on the pin, the preform would undergo severe damage, as previously indicated. However, since this scenario is nevertheless possible, it demonstrates that Frontier is deficient in its teaching and indicates that the skilled addressee would be required to expend inventive faculty in developing the teachings of Frontier to move towards the

present invention as claimed because the skilled person could operate Frontier using this first operational regime. Hence the independent claim of the application is still differentiated over Frontier.

ii) The release point is where the mouth of the preform and the top of the tip are exactly level. Besides being difficult to judge and control (from perspective of the momentum associated with the weight of a loaded robot), the second position of the robot is therefore not attained "to cause insertion of the tip of the cooling pin into the molded article...". Again, the preform would still undergo damage, as previously indicated, by dropping the preform onto the tip of the pin. Since this is again conjecture, it demonstrates that Frontier is deficient in its teaching and indicates that the skilled addressee would be required to expend inventive faculty in developing the teachings of Frontier to move towards the present invention as claimed because the skilled person could operate Frontier using this second regime. Hence the independent claim of the application is still differentiated over Frontier.

iii) The release point is where the tip of the cooling pin has entered the preform, including at a point where the preform is lowered gently onto and placed on top of the tip of the pin. In this instance, in contrast with the claim, relative movement between the pin and frame does not occur

after the end-of-arm tool reaches the second position". Even this conjectured scenario demonstrates that Frontier is incomplete in its teaching and indicates that the skilled addressee would, doubtlessly, be required to expend inventive faculty in developing the teachings of Frontier to move towards the present invention as claimed because the skilled person could operate Frontier using the this third regime. Hence the independent claim of the application is still differentiated over Frontier.

The claimed invention is therefore differentiated over Frontier in view of the relative mechanical collaboration, structure and timing between the array of pins, the take-out plate holding the hot preforms and the physical construction of the various independent structural elements. Frontier does not and cannot therefore anticipate the claimed invention.

It is further submitted that the insulative properties of the plastics material of the preform mean that in the transfer process from the robot to the cooling chamber 30 of Frontier would, at some point, cause the interior surface temperature to rise as a consequence of the temperature profile within the preform. Consequently, to ensure that the crystal-glass transition temperature (above which deformation would occur) of the internal surface is not exceeded prior to the use of the cooling pin, the preform must be cooled sufficiently in the mold before subsequent location onto the cooling pin in the

cooling chamber 30. Consequently, the system of Frontier is less efficient than the present invention because the cycle time of the process of Frontier is necessarily longer to ensure that deformation cannot occur through physical contact with the upstanding cylindrical protrusions 146. Indeed, the slow cycle time of Frontier is the very issue that the present invention seeks to resolve.

In any event, there is no discussion in Frontier that crystallization is a particular problem in a region surrounding the sprue gate. While Frontier suggests interior cooling through use of some form of cooling pin and an associated fan based system, its interior cooling occurs at a significantly later point in the manufacturing process and nevertheless seeks to attain a homogenous cooling effect. Starting with Frontier, the skilled person would therefore have to resolve multiple technical implementation issues to arrive at the system of the present invention, with the skilled person therefore having to employ inventive faculty in arriving at the present invention. There is, quite simply, no single logical step leading from Frontier to the present invention, as will become evident in the subsequent discussion on the other cited art of record. The Applicant therefore respectfully asserts that the Examiner has incorrectly interpreted Frontier and has applied hindsight to trivialize the present invention. Frontier is concerned with providing a total cooling system for the interior and exterior

of preforms, which cooling system is provided by a specific chamber employing convection techniques. Frontier does not provide a workable system, and at best operates at both low pressures and relatively low initial preform temperatures that still result in crystallization.

Referring now to the Bellehache document (US patent 4,592,719) and the Examiner's rejection under 35 U.S.C. §103(a), the Examiner is already faced with a myriad of incompatible problems with, and lack of teaching in, Frontier that cannot be and are not addressed by Bellehache (alone or in combination). Bellehache addresses a technical problem of cooling plastic articles, especially on pneumatic part transfer grips 25 during part transfer (see: column 1, lines 21 to 24, 27 to 29, 32 and 33, 45 to 47, 52 and 53; column 2, lines 22 and 23; and column 5, lines 8 to 10). Bellehache promotes the advantage of its system as being one in which additional cooling platforms are eliminated by virtue of the direct cooling of the preforms on their associated transfer grippers.

Bellehache teaches cooling of preforms directly on pneumatic grips 25. With the interior grips 25 inserted into the preform, air (at atmospheric pressure) is drawn from about the mouth of the preform and down the annular chamber 27 produced between the outer surface of the interior grips 25 and the internal surface of the preform (see FIG. 3). As the air passes down the preform, it generally acts to cool the inside

surfaces of the preform, although it is submitted that cooling efficiency is low and variable in view of the overriding laminar flow characteristics that are obtained as a consequence of the shape of the annular chamber 27. Indeed, it is submitted that there is very little mixing between layers within the air that is drawn under suction along the annular chamber 27. Moreover, as air is drawn into the preform and moves along the hot preform, its surface layer is (principally) heated. Because heating of the air has now occurred as the air moves towards the domed area of the preform, the effective cooling efficiency of the air (as it approaches the hot dome-end of the preform) is significantly reduced, especially in relation to the dome area where crystallization is a particular problem. In fact, since air passages 34 exist in the end of the grips 25, the natural flow of air (under negative pressure) is drawn directly into the interior duct 28 of the grips 25 and hence air actually avoids making contact with the very hot injection point of the preform, i.e. the gate region in the very bottom of the preform dome. Indeed, suction applied through the interior duct 28 actually reduces pressure in the vicinity of the gate region and inhibits any air cooling effect, with the teachings of Bellehache therefore being such as to induce crystallization in the domed region of the preform. Furthermore, with reference to FIG. 3 of Bellehache, the arched prongs 32 are constructed to contact the inside surface of the

preform since “[T]heir outer surface matches the internal, concave, contact contour 33 of bottom 7 of the preform” (see column 3, lines 27 to 39). Hence, like Frontier and in contrast with the claimed invention, Bellehache describes a system that has an internal pipe that touches the preform, which touching contact would cause surface scratching and deformation to either a hot preform that is removed early from the mold or to a preform undergoing a surface re-heating effect.

Also, the system operation of Bellehache is laborious and slow, as evidenced by the various process steps shown in FIG. 8. By the time that the original take-out plate (mobile base 11) has been re-orientated (see FIGs. 8.4 to 8.6), crystallization is likely to have already commenced.

Consequently, in Bellehache, there is absolutely no aggressive cooling of the preform at the relatively hot domed region, nor do the interior grips 25 expel gaseous cooling fluid mostly in a direction of the first region. In Bellehache there is simply no focused cooling and, if anything, Bellehache simply looks to provide uniform cooling, although this cannot be achieved because the interior domed area of the preform is not effectively cooled as a consequence of the flow path (through the passages 34) that must be adopted by the already heated air. Moreover, Bellehache is entirely silent and devoid of any suggestion on:

- the requirement for non-uniform cooling of a molded article;
- the fact that a hot area (opposite the gate at the bottom end of the article) exists as a result of very early removal of the part from the mold before the preform has been cooled to a safe limit for conventional post mold cooling;
- that there is, after early removal from a mold, an increased risk of crystallization at the bottom end area of the article as a result of the non-uniform high heat and the reheating affect in this area;
- that crystallization occurs and is particularly problematic at the bottom (domed) end area of the preform;

The Examiner suggests that the combination of Bellehache and Frontier would generally render the invention obvious to the skilled person, but it is respectfully submitted that this is simply unrealistic and based on hindsight and the use of inventive faculty. Fundamentally, the teaching of Frontier and Bellehache are at odds with each other, with Frontier providing a low pressure uniform cooling through a blowing function and Bellehache sucking air into the preform and avoiding cooling at the interior domed end portion of the preform. The Examiner is essentially suggesting that the skilled person would i) separate (i.e. space away) the cooling

pin from the end of the preform, and ii) then provide a concentrated air blow iii) onto a specific area of the preform that iv) addresses the very early release of the preform from a mold.

Firstly, neither Frontier nor Bellehache (nor, for that matter, any document in the record) address the technical problems associated with the very early release of a preform from a mold. Nor do Frontier and Bellehache indicate the requirement for concentrated cooling of the relatively hot areas (e.g. the preform dome). In fact, both Frontier and Bellehache apply post mold cooling techniques to preforms that have been released in a stable physical state after prolonged in-mold cooling; the reasoning for this has been explained above. Secondly, in order to avoid touching contact between an interior pin and the preform, the skilled person would need entirely to re-engineering the dedicated preform cooler 10 of Frontier and move away from the technical solution provided by Frontier. For example, the cylindrical protrusions 146 of Frontier would need to be re-orientated to avoid touching contact caused by gravity and/or the uniform cooling expounded by Frontier would have to be terminated in favor of a dedicated and focused cooling regime. Furthermore, would the person of ordinary skill in the art apply a sucking or blowing function to the cylindrical protrusions 146 of Frontier? If the Examiner is suggesting that Frontier cylindrical protrusions 146 are

modified to include the interior grips of the Bellehache, then the blowers 16 of Frontier are replaced with suction pumps as taught in Bellehache with the consequence that the upstanding protrusions in Frontier now operate in an entirely analogous way to Bellehache (albeit that the cylindrical protrusions 146 are mounted with a horizontal conveyer system of a dedicated preform cooler 10, 30).

If the Examiner is suggesting that the suction applied to the draw air into the preform in Bellehache is replaced by a blowing system, then the skilled person is initially presented with the problem that Bellehache no longer functions! In any event, Bellehache only discloses the use of a suction function in relation to interior cooling, which suction is not concentrated and which suction cannot cool the interior domed portion of the preform. More specifically, the suction applied in Bellehache is used to secure the preforms to the transfer device of mobile base 23; this is described in detail between column 3, line 26 to column 4, line 52). If the flow of air is now reversed, the mobile base 23 cannot act to transfer the preforms and, in fact, would act to jettison (i.e. fire under applied pressure) the preforms back into the cylindrical bodies 14 or out into space. As such, it is not possible to reverse the flow of air in Bellehache in view of an underlying technical inconsistency. As such, the combination of Frontier and Bellehache would be rejected by a person of ordinary skill

in the art as being technically incompatible, and the Examiner's argument is shown to be based on the inappropriate cherry-picking of incompatible features.

At best, the combination of Bellehache and Frontier would provide a system in which the interior grippers of Bellehache substitute the extraction device 51 of Frontier, whereby there is a two-level cooling process applied both during the transfer stage and then a dedicated cooling chamber (preform cooler) stage. However, that said, the purpose of Bellehache was to remove the requirement for a secondary and dedicated preform cooler, so the skilled person is left with a further problem to resolve.

In summary, Frontier and Bellehache are incompatible, and neither describes all the technical elements required to arrive at the invention as now claimed in the application. Bellehache is directed to eliminating post mold cooling platforms, e.g. the dedicated preform cooler of Frontier. The specific teachings of the Frontier or Bellehache references cannot be applied (singly or in combination) to solve the Applicant's underlying technical problem, nor do the teaching of Frontier or Bellehache suggest the benefit of the Applicant invention as claimed. Hence, it is respectfully submitted that the Examiner has founded an invalid and unsustainable argument against inventive step based on Frontier, with the argument relying on a mosaic of art that simply doesn't exist.

In looking at the application, it will be appreciated that the technical problem to be solved is "how is it possible to avoid deformation in a molded article when the molded article is released from its mold at an average temperature significantly above its glass transition point"? Expressed a different way, the question alternatively becomes "what processing is required to decrease cycle time in the knowledge that early part removal of a preform from a mold results in the preform retaining sufficient heat to induce post-mold crystallization"? When unaddressed, the technical problem otherwise manifests itself in part deformation and hence inferior part quality, as described in column 1, lines 32 to 48 of the granted EP specification, namely "*[T]wo things typically happen if a preform is rapidly ejected from a mold in order to reduce the cycle time of the injection process. The first is that the preform is not uniformly cooled. In most instances, the bottom portion opposed to the mold gate is crystallized. The amount of heat accumulated in the walls of the preforms during the injection process will still be high enough to induce post molding crystallinity especially in the gate area of the preform. The gate area is a very critical spot because cooling of the mold in this portion is not effective enough and also because the resin in the mold cavity space is still in contact with the hot stem of the hot runner injection nozzle.*

If this area of a preform remains crystalline above a certain size and depth, this will weaken the quality of a blown article. The second is that the preform will be too soft and thus can be deformed during the next handling steps...". And more generally, column 10, lines 18 to 36 of the granted EP patent states "[I]n order to reduce the overall cycle time, the residence time of the preform in the mold has to be minimal so that the mold is able to produce batches of preforms as fast as possible. The problem with a reduced residence time in the mold is that the cooling time has to be reduced, but in such a manner that the molded articles or preforms are solid enough to withstand all the subsequent handling steps without deformation. A reduced cooling time is a problematic option because the articles or preforms are not sufficiently and uniformly cooled by the cooling means 42 and 44. The amount of heat retained by the article or preform after being cooled inside the mold for a reduced time and immediately after opening the mold is very significant and depends on the thickness of the molded article or preform. This internal heat has the potential to generate crystallized portions at the sprue gate area or dome portion of the molded article or preform, the neck finish portion of the molded article or preform, or the entire preform".

In relation to the invention itself, the specification goes on to state that "[T]he innovative molding

and cooling method of the present invention includes removing the preforms from the mold before the preforms are fully cooled inside the mold, i.e. the preforms retain a certain amount of heat that may potentially crystallize the sprue gate portion, the neck finish portion or the entire preform; retaining the preforms outside the molding area; and internally cooling the preforms by convection heat transfer so that crystallization does not occur in any of those regions" (see column 4, lines 33 to 38 of the granted EP specification).

The specification of the application clearly states that "aggressive" cooling (see column 10, line 68 to 38) is achieved by "an array of cooling pins 74 whose role is to deliver a cooling fluid inside the molded articles held by the take-off plate 60. The cooling fluid mostly directed and delivered directly into the dome (sprue gate) portion 22...which has the highest chance to become crystalline" (see column 11, lines 44 to 52). The cooling mechanism is supported, in a preferred embodiment, by a pressurized air delivery system (see: column 11, lines 53 to 58). Furthermore, as indicated in column 13, lines 11 to 14, the "cooling pin is intended to concentrate maximum cooling at the sprue gate or dome portion of the molded article 48 and thus aggressively focus the cooling fluid to cool this region".

Operation of the frame supporting the cooling pins occurs when the "take-off plate 60 reaches its final out of

mold position... so that the cooling pins 74 can be immediately introduced inside the molded article", as described in column 13, lines 40 to 46. It will be appreciated that there is always a finite time to deliver the cooling pin into the molded article defined by a finite time that it takes to remove the core from the molded article and to move the take-out plate to a position where the mold can be reformed (for another injection step) and the frame moved to engage the molded articles; this is described, for example, in column 15, lines 38 to 52.

In anticipation that that Examiner may decide to extend further the examination of the above application to include prior art cited in the IDS, the Applicant will now dismiss the relevance of US patent 5,114,327 to Williamson. Indeed, the Applicant has previously considered this Williamson '327 document to be the closest piece of prior art, as can be seen from reference to the corresponding European (EPO) file wrapper, since Frontier most assuredly contains many considerable and structural dissimilarities with the present invention. However, even given the starting point Williamson '327, the skilled person is still presented with having to rely on a mosaic of prior art documents that nevertheless are deficient in their singular and combined teachings. In other words, the skilled addressee could only arrive at the presently claimed invention (based on Williamson '327 and other

documents) by employing a construction that is artificial, inventive and based on the selective isolation of incompatible features through the use of inappropriate hindsight.

Whilst Williamson '327 may include a central cooling stem having openings 92 in its stem 90, Williamson '327 is a closed system that fails to disclose the use of a central internal channel that directs coolant principally to the gate portion of the preform. The use of carbonic and the distribution of the openings along the length of the stem indicate that the cooling system is considered sufficient to sink heat from the entire preform, i.e. the Williamson '327 system once again looks to a homogenous cooling effect. Williamson '327 does not identify any particular area that is of particular concern with respect to potential and actual crystallization, nor does Williamson '327 indicate that it is desirable to focus coolant onto the gate area. Williamson '327 is, in fact, self-contained and provides no indication of any problem that the system of Williamson '327 needs to address. The skilled person would therefore have no incentive to search for further improvements over the base technology of Williamson '327.

By way of further clarification and to accentuate differentiation over Williamson '327, the independent claims recite that an open system is formed in relation to the cooling pin and molded article, wherein the open system has a

passageway that allows venting of gaseous cooling fluid from an interior of the molded article to an ambient environment; this amendment is clearly supported by FIG. 9a and the accompanying text that states that "there is outcoming warm air that freely escapes from the preform" (column 12, lines 33 to 36 of the granted EP patent).

In no way is Williamson '327 able to expel cooling fluid from the tip of a cooling pin *mostly* in a direction of the first region to accentuate cooling in the first region. Rather, Williamson '327 expels cooling fluid from "a plurality of small apertures" along the entire length of the stem element and not from the tip of the stem element. In fact, there is no description, suggestion nor figurative illustration that indicates that the stem element in Williamson '327 has a tip having a hole at its end and certainly not a hole principally responsible for ensuring that cooling fluid is expelled mostly in the direction of the first region. In fact, Williamson '327 allows cooling fluid to impinge initially on the sides of the parison that are, in the terminology of the present claims, the adjacent regions of relatively lower heat. Indeed, in Williamson '327, the cooling fluid is expelled, through the plurality of apertures, tangentially with respect to the first region and therefore mostly in the direction of and onto the second region. Of course, with time, the cooling fluid will circulate within the sealed or closed system of Williamson '327

to reach eventually the domed portion of the parison, but by this time the cooling fluid will have become heated as a consequence of its incidence onto the sides walls of the parison. And the benefit in aggressively cooling the first region to prevent crystallization (as taught by the present invention) is reduced in Williamson '327 from the perspectives of both time delay and reduced temperature differential between the cooling fluid and the temperature of the first region.

Consequently, it would be wrong to entertain any suggest that the differences between Williamson '327 and the present invention are limited to the facts that the present invention uses gaseous cooling fluid and that the cooling fluid vents from the interior of the molded article to an ambient environment. Williamson '327 further does not expel cooling fluid mostly in a direction of the first region of relatively high heat with respect to an adjacent region of relatively lower heat, as should now be apparent. As such, Williamson '327 has no time-critical focused cooling, nor does Williamson '327 suggest that there is any issue with early part removal of a molded part from a mold.

It would also be inappropriate and untenable to suggest that a person of ordinary skill in the art would modify the teachings of Williamson '327 to remove the requirement for a vacuum system and hence to move from a closed system environment to an open (ambient) system environment as claimed.

More specifically, there is simply no incentive for the skilled person to move towards an open system condition that vents to an ambient environment especially since this goes against the entire teaching of Williamson '327. In fact, Williamson '327 specifically and repeatedly requires (see, for example, column 2, lines 43 to 36 and lines 56 to 64, column 5, lines 39 to 49 and claim 1) the system to insure "the extraction of a maximum amount of heat from the work piece with the minimum amount of cooled fluid"... that is "prevented from escaping into the atmosphere by seal means" and "then recycled through the filtering unit 59 and chilling unit 60 back to the source of cooling fluid". Any invalidly formulated argument against non-obviousness would therefore need to disregard, as obvious, all the required and essentially implemented features of Williamson '327 to allow any form of modification of the basic Williamson '327 architecture. Moreover, by moving towards an open system and removing the requirement for a vacuum, any modified system based on Williamson '327 would no longer be able to minimize its use of cooling fluid. In any event, the system of Williamson '327 also requires a vacuum to hold the part in the cooling tube.

Besides the foregoing, combining an open-system with a closed system presents the skilled person with a dilemma as to which system is best and which solution should be rejected. These open-system and closed system technologies are therefore

at opposite ends of the solution path, and would require the employment of inventive faculty to resolve the underlying technical conflict about which system was appropriate to use. Indeed, starting from any closed system, the skilled person would be left with insurmountable technical hurdles in modifying that closed system to arrive at the system of the present invention. The skilled person would therefore view any closed system as entirely incompatible with open systems since they these technology alternatives represent a technical dichotomy that cannot be reconciled. Quite simply, the technical incompatibility of open-systems with closed systems would fundamentally cause the skilled addressee to reject one of these two mutually exclusive systems, whereby any argument supporting a claim to obviousness would be flawed, unsustainable (from the perspective of established patent law and examination procedure) and would inappropriately trivialize the present invention.

The rejections raised by the Examiner are believed to have been addressed. The remaining art of record, taken singly or in combination, is not considered germane to the patentability of the present invention as now claimed.

In view of the above amendments and remarks, it is believed that this application is now in condition for allowance, and a Notice thereof is respectfully requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 625-3500. All correspondence should continue to be directed to our address given below.

Respectfully submitted,



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